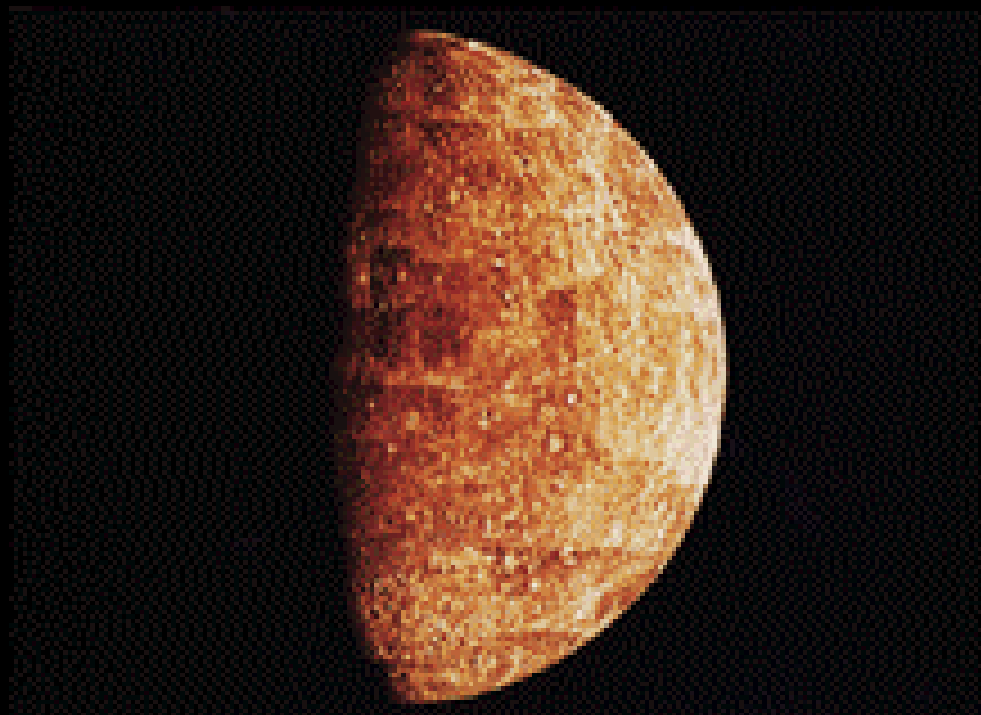
Mercury

Emissions and Controls

Three Forms of Mercury

- Solid (Hg_p)
- Easily captured in FF or ESP



Three Forms of Mercury

- Ionic (Hg^{++})
- Water soluble
- Easily captured in scrubber

Three Forms of Mercury

- Elemental (Hg^0)
- S.G. = 13.5
- B.P. = 674 ^oF
- 10% - 90% of emissions
- Difficult to capture

Worldwide Atmospheric Emissions

- 5500 tpy
- 40% Natural
- 60% Anthropogenic

US Anthropogenic Atmospheric Emissions (192 tpy)

- Power Plants = 45 tpy (26 Hg^{o}, 18 Hg^{++}, 1 Hg_{p}) E.g., Colstrip = 612 lb in 1998
- Incinerators = 16 tpy
- Industrial boilers = 12 tpy
- Other (e.g., taconite in MN = 758 lb/3642 lb total in 2000)

Coal Characteristics

- Eastern bituminous (high Hg @ 85-125ppb and Cl @ 900-1200ppm)
- Western sub-bituminous (low Hg @ 40-85ppb and Cl @ 70-100ppm)
- Western coal emissions predominately elemental

Emission Factors

- AP-42 uncontrolled = 16 lb/10E12 Btu
- AP-42 controlled = 3-8 lb/10E12 Btu
- AP-42 assumes 50%-80% removal

Typical Emission Controls

- NOx (SCR)
- SO2 (wet or dry scrubbing)
- PM (FF or ESP)
- Typical SO2/PM controls catch 40% (0-90+%) of Hg

Applications We Have Seen

- WYGEN2 @ 0.28 tpy
- Longview @ 0.09 tpy
- Hardin @ 0.009 tpy
- IPP3 @ 0.08 tpy
- Plum Pt @ 0.29 tpy
- Santee Cooper @ 0.16 tpy
- Roundup @ 0.09 tpy
- Mustang @ 0.04 tpy
- Thoroughbred @ 0.21 tpy

Mercury Control Technologies

- Coal washing removal = 20% - 40%
- Circulating Dry Scrubbing (CDS) with PAC injection
- Sorbent injection (flyash or PAC @ 60-90% avg; max > 90% reduction)

Our Current Approach

- Accept SCR + Scrubbing + PM controls as BACT = 45%-99% control?
- No reliable monitoring technique

Coming Soon

- MACT (proposal due 12/15/03; final 12/15/04; compliance 12/15/07)
- Multi-Pollutant Law?

Possible Multi-Pollutant Laws

- Administration 3-P Bill = 69% reduction by 2018 w trading
- Clean Pwr Act = 90% reduction by 2007; no trading
- Omnibus Hg Emission Reduction Act = 90% reduction with site-only trading